ESTONIAN UNIVERSITY OF LIFE SCIENCES

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PREVALENCE OF INDICATORS OF DENTAL DISEASES IN DOGS AND CATS: RISK FACTORS FOR ORAL PATHOLOGY AND CORRELATION OF OWNER PERCEPTION WITH CLINICAL EXAMINATION FINDINGS

SUUÕÕNE JA HAMMASTIKU HAIGUSTELE VIITAVATE KLIINILISTE TUNNUSTE ESINEMINE KOERTEL JA KASSIDEL: SUUÕÕNE PATOLOOGIA RISKIFAKTORID JA OMANIKUPOOLSE HINNANGU SEOS KLIINILISE LÄBIVAATUSE LEIDUDEGA

Final Thesis in Veterinary Medicine

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ABSTRACT

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Dental diseases in dogs and cats are very common and many of them are treatable. Untreated dental diseases might cause e.g. discomfort, pain or dysphagia. The aim of this study was to find out how much dental pathologies occur among dogs and cats in Estonia and which are the risk factors for high prevalence of these pathologies. The other aim was to find out whether the owners are able to evaluate their pets oral health.

The material for the study was collected via a questionnaire, which was filled by veterinarians and owners in three different small animal clinics in Estonia. We included 460 animals in the research. A veterinarian conducted an awake intraoral examination. The owners answered questions about their pets dental care at home and about the source from where they received information about animal dental diseases. In addition the owners were asked to evaluate their pets oral health status.

The most seen pathologies in oral cavity were plaque, calculus and gingivitis. At least one pathology occurred in 84% of patients.

Risk factors for oral pathologies are the age of over two years in both dogs and cats and small size (under 10 kg) in dogs. Size (over 5 kg) in cats and non-mesocephalic skull type in dogs have a weak correlation with oral pathologies.

Based on this study owners are able to evaluate their pets dental health. The owners' evaluations have statistically significant correlation with veterinarians findings.

Keywords: diagnosing, awake oral examination, oral home care

LÜHIKOKKUVÕTE

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Kasside ja koerte hambahaigused on tänapäeval levinud ja väga paljusid neist on võimalik ravida. Ravimata hambahaigused võivad põhjustada ebamugavust, valu ning söömisraskusi. Töö eesmärgiks oli saada teada, kui palju hambahaigustele omaseid kliinilisi tunnuseid esineb koertel ja kassidel Eestis ning mis oleks riskifaktorid hambahaiguste esinemisele. Uuringus tahtsime selgitada ka kui hästi omanikud oskavad lemmiku suu tervist hinnata.

Uuringu andmed koguti küsitluse abil, mille täitsid loomaarstid ning loomaomanikud kolmes kliinikus Eestis. Uuringus kasutati 460 looma andmeid. Loomaarst teostas ärkvel suuõõne ülevaatuse. Omanik vastas küsimustele lemmiku koduse hambahoolduse kohta, teadmistest hambahaiguste kohta ning soovidest infomatsiooni saamise kohta. Omanikku paluti hinnata tema lemmiku suu tervist. Kõige rohkem esinevad patoloogiad olid hambakatt, hambakivi ning gingiviit. Vähemalt üks suuõõne patoloogia esines 84%-il loomadest. Riskifaktoriteks suuõõne patoloogiate esinemisele oli vanus üle kahe aasta koertel ja kassidel ning väike suurus (alla 10 kg) koertel. Nõrk korrelatsioon patoloogiatele oli kassidel suurus (üle 5 kg) ning koertel mitte-mesokefaalne kolju tüüp. Selle uuringu põhjalt võib järeldada, et omanikud oskavad hinnata looma suu tervist. Enamusel langeb hinnang kokku loomaarsti leidudega.

Märksõnad: suuõõne patoloogiate levimus, suu ülevaatus ärkvel, kodune suu hooldus

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LIST OF ABBREVIATIONS

AVDC – American Veterinary Dental College

CAL – clinical attachment loss

CUPS – chronic ulcerative paradental stomatitis

EMÜ – Eesti Maaülikool

FCGS – feline chronic gingivostomatitis

FORL – feline odontoclastic resorptive lesion

MCA – multiple correspondence analysis

PD – periodontal disease

TR – tooth resorption

WSAVA – World Small Animal Veterinary Association

INTRODUCTION

Dental diseases are very common in dogs and cats. Research and knowledge have increased tremendously in the past few decades. Nowadays, breeding also has a great impact on dogs' and and cats' oral health. Oral health influences comprehensively the life and well-being of every animal and human. Some of oral diseases can be very painful and cause discomfort and even dysphagia. Dogs and especially cats hide pain very well. But even when they would want to, showing pain in the mouth is very difficult.

Every owner does not know that pets' teeth require attention and care. If the owner hasn't noticed any problems and does not realize that help is needed, the professional of the field should always bring up conversation about teeth if anything abnormal appears. Whenever a pet is taken to a veterinarian, a thorough awake intraoral examination should be included in the clinical examination. If any doubts arise, further diagnostics should be recommended to find the right diagnosis and treatment plan.

When the riskfactors for oral pathologies are known, more attention can be focused on patients with higher risk and thus better prevent the disease. An excellent situation to teach the owner how to look in their pet's mouth is when a puppy or kitten comes to a veterinarian for the first vaccinations. The veterinarian could teach the owner what to observe and when to book an appointment with a veterinarian. Also tooth brushing can be taught. Special information can be given according to the pet's breed. The best way to prevent problems is to instruct the owners so that the rising problems can be detected earlier.

Attention can be paid to regional prevalences when students and veterinarians are educated. Which are the most prevalent disorders seen in the region and where to pay extra attention? In busy everyday work one might not have time to fully evaluate the whole oral cavity, so at least the most important points to look at are good to know. In case of a critical patient of some other organ system, dental evaluation might however not be relevant. Safety should also always be kept in mind. Before going straight into the pet's mouth, calm approach and gentle greeting as well as hand-off surveillance of the pet's temper are very recommended.

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1 LITERATURE REVIEW

1.1 Prevalence of dental diseases of dogs and cats

Numbers vary among different studies and sources, but oral disorders, especially periodontal diseases are very common in small animals. In their two separate studies, O'Neill *et al.* (2014) found out prevalences of most common disorders in dogs and cats attending primary-care veterinary practices in England. When all prophylactic (e.g. vaccination) and elective (e.g. neutering) clinical events were not included, periodontal disease was the second most common diagnosis-level disorder in dogs (n = 361; 9.3%) and the most common in cats (n = 499; 13.9%). In the study of cats, dental disorder was also the most common group of disorders (n = 540; 15.1%). Dental pathologies were reported only if currently being treated, so periodontitis in these studies included only the worst scenarios.

According to Robinson *et al. (*2016), the two most common diagnoses in their study were obesity and periodontal disease (both n = 210; 6.6%). The aim in their research was to find out factors influencing diagnose making, the most common diagnoses in first-opinion small-animal consultations as well as to classify the types of diagnoses made in the United Kingdom.

In their research in private veterinary practices in USA (Lund *et al.*,1999), the two most diagnosed disorders were dental calculus (dogs n = 6 454; 20.5% and cats n = 3 685; 24.2%) and gingivitis (dogs n = 6 139; 19.5% and cats n = 1 995; 13.1%).

In the study in the Czech Republic (Kyllar and Witter, 2005) 85.3% of randomly selected dogs in a small animal practice had dental alterations. The most detected defects were calculus (61.3% of all dogs attending the study), periodontal disease (60.0%), missing teeth (33.8%) and abnormal attrition (5.9%). Periodontitis occurred more often with small older dogs and in upper jaw than lower. Calculus in young dogs occurred mostly in small breeds. Malocclusions were also common in small dogs.

In cats, one of the most common dental disease is tooth resorption (TR). The term feline odontoclastic resorptive lesion (FORL) has also been used, but TR is nowadays preferred. Prevalence varies greatly depending on population and the methods used (Heaton *et al.*, 2004). According to their studies, diagnosis of FORL was made based on oral examination

and full-mouth radiographic imaging and the detected prevalence was 32% (Pettersson and Mannerfelt, 2003) and 30.7% (Heaton *et al.*, 2004). Increasing age was detected to be correlated with prevalence of FORL (Pettersson and Mannerfelt, 2003). Many prevalence testing studies don't use radiographic imaging which leaves many cats with FORL undiagnosed and the prevalence is lower than it actually is (Pettersson and Mannerfelt, 2003). Verstraere *et al.* (1996) examined macroscopically 301 adult feral cat skulls from Marion Island. The most relevant findings were prevalence of periodontitis and tooth loss (61.8%), dental fractures including crown and roots (54.8%), abnormal thickening of manibula (39.5%), enamel hypoplasia (24.6%), dental abrasion (19.3%), and TR (14.3%). Each cat had on average 2.3-4.1 lesions. Mandibular thickening correlated significantly with periodontitis and fractures.

1.2 Awake orofacial and intraoral examination

Awake (non-sedated) orofacial and intraoral examination should always be included in clinical examination (Fulton *et al.*, 2014). First, hand-off surveillance of the face and head can be done while the owner discribes the pet's medical history, current complaints and health status. The owners' concerns should always be paid attention to. Important points to be asked from the owner: changes in eating, pica or chewing habits, abnormal swallowing, ptyalism, halitosis, sneezing, nasal discharge, yelping upon yawning or other marks for pain (Niemiec, 2012). Secondly, palpation of head and neck is performed and especially spasms, lumps, swelling, asymmetries, pain or hypersensitivity or abnormal behavior are observed in examination (Niemiec, 2012).

After the orofacial examination follows the intraoral examination. The goal is to get as thorough examination as possible to evaluate the changes in the mouth and the need for further diagnostics. It should include evaluation of the lips, mucosa, gingiva, teeth, periodontium, tongue and oral cavity (BSAVA, 2007). Gingiva should be evaluated and examined for changed colour, swelling or enlargement, recession, hyperemia, spontaneous bleeding or sulcal exudates (Niemiec, 2012). When evaluating the lips focus should be kept on possible laceration, de- or hyperpigmentation, inflammation, erythema or ulcers (Niemiec, 2012).

Dental evaluation includes inspection for malocclusion, avulsions, fractures, discoloration, plaque, calculus, caries, developmental defects and abnormal shape (BSAVA, 2007). Evaluation of periodontium recuires general anaesthesia (Lewis, 2013).

Examination gives information to evaluate the risks and benefits so that a plan for treatment can be formed (Lewis, 2013). However, owners should always be told that the final plan can be done after a full dental examination under general anaesthesia (BSAVA, 2007).

1.3 Diagnosing dental diseases

Every puppy born by cesarean section should be examined by a veterinarian. Clefts of primary or secondary palate can be easily marked and evaluated (Fulton *et al.,* 2014). Puppies with cleft palate also often have other congenital problems, which have a significant influence on the prognosis (Fulton *et al.,* 2014). Treatment for cleft palate before surgery is supportive care, which might include tube feeding to avoid aspiration pneumonia (BSAVA, 2007). Surgery is performed usually at the age of 2-4 months (BSAVA, 2007). Still, deep and long clefts are very difficult cases and with some patients euthanasia may be the most appropriate option right after birth because of poor prognosis (Fulton *et al.,* 2014).

It is very important to examine teeth carefully on the first vaccination visit at the clinic. When a deciduous tooth is absent on a pediatric patient, then the permanent tooth is also absent (Fulton *et al.,* 2014). Exceptions to this are molars and first premolars, which do not have deciduous predecessors at all (Niemiec *et al.,* 2018). A deciduous tooth is considered persistent in the situation where the deciduous tooth and its permanent counterpart are both present (Fulton *et al.,* 2014). A persistent deciduous tooth should be extracted, to avoid malocclusion of the permanent tooth and accumulation of food debris leading to increase of plaque and bacteria (Klein, 2005).

Depending on the patients' co-operation skills and temperament, many defects and pathologies can be detected during awake oral examination e.g. malocclusion, gingivitis, mucositis, enamel defect and plaque or calculus. Evaluating and staging of periodontal diseases requires measurements of periodontal pockets and gingival recession (Kortegaard *et al.,* 2014). These procedures require general anaesthesia to be completed carefully and throughout the oral cavity and they are also very time consuming (Kortegaard *et al.,* 2014).

Different screening protocols have been created for rapid screening for different diseases from large groups. In their research, Kortegaard *et al.* (2014) identified 96% of all teeth positive for clinical attachment loss > 1 mm by examining only maxillary second, third and fourth premolars, first incisors and canines. Kortegaard *et al.* (2014) also identified 97.3% of all teeth positive for pocket probing depth > 4 mm by examining only tooth pairs of all canines, maxillary second incisors, second molars and mandibular fourth premolars. If a positive result was found, full mouth examination was recommended to complete diagnosis (Kortegaard *et al.*, 2014). In cats, only taking radiographic pictures of tooth 307 and 407 reveals positive finding of FORL in 93.4% of cats with FORL (Heaton *et al.*, 2004).

The tooth root and most of periodontium can not be visualized, therefore intraoral radiographic imaging under general anaesthesia is essential to evaluate their condition (Pavlica and Nemec, 2010). Radiographic imaging is necessary for diagnosing e.g. periodontitis, TR, endodontic lesions, fractures, necrotic pulp, neoplasia or other oral abnormalities (BSAVA, 2007). Radiographic imaging also helps to determine treatment and evaluate condition pre- and post surgery (Niemiec, 2013). Intraoral radiographs are recommendable for every dental patient, but are indicated especially in cases of periodontal pockets, discolored or fractured teeth, gingival enlargement or masses, nasal discharge, resorptive lesions and painful or sensitive teeth (Bannon, 2013).

1.4 Inflammatory soft tissue pathologies

Gingivitis is defined as any inflammation of the gingiva, but the term is often used for plaque bacteria induced gingivitis (Niemiec, 2013). It is a reversible stage if treated (Niemiec *et al*., 2018). Gram-positive aerobic bacterial plaque forms a biofilm that adheres supragingivally to the teeth and stimulates the host inflammatory response (Niemiec, 2012). If not treated, gingivitis developes and plaque reaches the subgingival region and plaque bacteria changes to anaerobic gram-negative flora (BSAVA, 2007). Gingivitis develops rapidly, just in few weeks (Ingham and Gorrel, 2001). Common clinical features are erythema of gingiva, rounding of the gingival margins, bleeding and halitosis (Niemiec, 2012). The depth of gingival sulcus remains normal, except in cases of gingival hyperplasia (Niemiec, 2012). Different indices are used to evaluate gingival inflammation. Scoring on scale of 0-3 or 0-4 is common. On a four-point scale, GI0 is defined as normal gingiva (Niemiec, 2013). GI1 is

mild focal inflammation with light colour change. GI2 is same as above but involving the whole gingival margin. GI3 is defined as moderate inflammation with redness, edema and bleeding on probing. GI4 is severe inflammation with marked redness, edema, spontaneous bleeding and ulceration (Niemiec, 2013).

Gingival hyperplasia is also a common clinical finding in dogs and cats. Gingival hyperplasia is benign overgrowth of gingiva, but it forms pseudopockets which will encourage more plaque accumulation and increase risk of periodontitis (Niemiec, 2013). It is due to nonspecific chronic inflammation of gingiva or specific cause, e.g. drug related or hereditary (Niemiec, 2012). The term epulids is also often used. It is a clinical description, not a diagnosis. Epulids are usually histologically identified as focal fibrous hyperplasia, but fibromas and non-neoplastic odontogenic tumors may be called as an epulis (Niemiec, 2012).

Feline chronic gingivostomatitis (FCGS) is along TR one of the most common diseases in oral cavity in cats (Thomas *et al.,* 2017). Gingivostomatitis is a term defined as inflammation and proliferation of the gingiva, oral mucosa and other soft tissues in oral cavity (Niemiec, 2012). The etiology of FCGS is not yet totally clear, but evidence is emerging that FCGS is initiated from gingival inflammation and is perpetuated to the mucosa of oral cavity (Thomas *et al.*, 2017). Feline calicivirus has been proven to be a part in developing FCGS (Thomas *et al.,* 2017).

Chronic ulcerative paradental stomatitis (CUPS) is most common in small dogs but can occur in any breed (Niemiec, 2012). The disease is defined as ulcerative, immunomediated reaction of the oral tissues caused likely by bacterial plaque (Niemiec, 2012). Clinical features are intense oral pain, fetid halitosis and partial to complete anorexia.

1.5 Periodontitis

Periodontitis is along gingivitis one of the two main periodontal diseases. Periodontitis is defined as an inflammation and irreversible destruction of periodontal ligament, cementum and alveolar bone (Ingham and Gorrel 2001; Kortegaard *et al.,* 2008). Periodontitis is the most widespread dental disease in dogs with prevalence of between 44% and 80% (Klein, 2000; Butkovic *et al.,* 2001; Wallis *et al.,* 2015). Periodontitis is more frequent in small

breed dogs than large (Harvey *et al.*, 1994) and prevalence increases with age (Harvey *et al.*, 1994; Butkovic *et al.*, 2001; Ingham and Gorrel, 2001; Kortegaard *et al.*, 2008).

Gram-negative anaerobic bacteria and bacterial toxins stimulates the host to response by releasing cytokines and inflammatory mediators (Wallis *et al.*, 2015). The beginning and developing periodontitis depend on these complex interactions between periodontium, immune system and oral bacteria (Wiggs and Lobprise, 1997). Many other factors also predispose the disease progress: plaque and calculus, tooth crowding and morphology, mouth breathing, low saliva flow and systemic illnesses such as renal dysfunction and diabetes mellitus (Niemiec, 2012; Albuquerque, 2012).

Oral bacteria, salivary glycoproteins and extracellular polysaccharides make colonies in tooth surfaces and form biofilms which are called plaque (Wiggs and Lobprise, 1997). If not disturbed, plaque forms within 24 hours on the surface of a clean tooth and initiates inflammatory response (Niemiec *et al.*, 2018). Chronic gingivitis may not always develop into periodontitis in every patient, but periodontitis is always associated with gingivitis (Wiggs and Lobprise, 1997; Ingham and Gorrel, 2001). Subgingival and periodontal pockets are formed and gingiva may recess which leads to attachment loss of the teeth (BSAVA, 2007). Bone loss can be divided into two groups: vertical and horizontal.

Mineralized plaque is called calculus (Niemiec *et al.*, 2018). Minerals from saliva start to precipitate on the surface of the tooth crown (Niemiec, 2013). Calculus itself does not cause periodontitis, but as a good surface for more bacterial plaque and food debris to adhere, it helps the pathogenic development (Niemiec, 2013). Unlike plaque, calculus cannot be removed at home with tooth brushing – its removal can only be done by professional scaling at the veterinarian (BSAVA, 2007).

The most common clinical signs of periodontitis are halitosis, increased salivation, dysphagia, pain on chewing and bleeding gingiva (Wiggs and Lobprise, 1997). Also dogs with periodontitis may show very mild or no symptoms.

Periodontal assessment is performed under general anaesthesia. On visual inspection, common findings are gingival swelling or recession, redness and different shape of gingiva (BSAVA, 2007). Variable amount and distribution of calculus and plaque is present. The amount doesn't directly prove the severity of periodontitis, but usually the more calculus present the more severe disease can be expected (Kyllar and Witter, 2005). Different calculus and plaque indices are used, usually thickness or coverage of the tooth in percentage are

measured in scale 0-3 or 0-4 (Quest, 2013). Probing and radiographic imaging are used to evaluate periodontal attachment (BSAVA, 2007). Pocket depth from the free gingival margin to the base of the pocket is measured with a blunt-ended probe (Kortegaard *et al.*, 2014). The sulcus depth < 3 mm is normal in dogs and < 0.5 mm in cats (Niemiec, 2013). The measurement of gingival recession is taken from the current gingival margin to the cemento-enamel-junction (BSAVA, 2007). Clinical attacment loss (CAL) is the sum of pocket depth and gingival recession (Kortegaard *et al.*, 2014). All findings should be marked in a dental chart after thorough oral examination. Severe cases of attachment loss and bone loss can lead to exposure of furcation region of multirooted teeth (Wiggs and Lobprise, 1997).

In their study, Kortegaard *et al.* (2008) found out that prevalence of CAL ≥ 1 mm is 20% in one-year-old dogs and 84% in the dogs over three years of age. The prevalence of CAL ≥ 4 mm is only 7%. The most prone teeth to CAL ≥ 1 mm are maxillary second, third and fourth premolars and the most prone teeth to pocket depth ≥ 4 mm are maxillary canines (Kortegaard *et al.*, 2008).

Stages of periodontal disease (PD) describe the severity of the disease (Niemiec *et al.*, 2018). Attachment loss is measured either with probing of the clinical attachment level or using radiological determination of the distance of the alveolar margin from the cementoenamel junction relative to the length of the root (Niemiec *et al.*, 2018). Normal (PD0): no clinical evidence of gingivitis or periodontitis. Stage 1 (PD1): only gingivitis is present, alveolar margin is normal and no attachment loss exists. Stage 2 – early periodontitis (PD2): there are early radiologic signs of periodontitis and less than 25% of attachment loss. Stage 3 – moderate periodontitis (PD3): there is 25-50% attachment loss. Stage 4 – advanced periodontitis (PD4): there is more than 50% attachment loss (Niemiec *et al.*, 2018).

Typical radiographic findings of periodontitis are generalized horizontal or localized vertical alveolar bone loss, widening of the periodontal ligament space and alveolar bone destruction (Niemiec, 2013). Full mouth examination is always recommended to find all pathologic lesions (Niemiec, 2013).

Treatment of periodontitis in the clinic under general anaesthesia begins by flushing the oral cavity with a dilute solution of chlorhexidine gluconate, which reduces the bacterial aerosol during mechanical scaling. Supra- and subgingival plaque and calculus are removed with mechanical scaling and hand scaling with different curettes (Niemiec, 2013). After scaling,

the teeth are polished to smooth over the little scraches which may have been created by scaling. Depending on the severity of attachment loss, other treatment is often needed and the most used is closed root planing, also called as non-surgical tooth debridement (Niemiec, 2013). However, if the surrounding tissue of the tooth is very damaged and tooth mobility exists, tooth extraction might be the only choice of treatment (Niemiec, 2013).

Severe bone loss can lead to oronasal fistula or abscess (Niemiec *et al.,* 2018). Fistula is an outcome of chronic periodontitis, which has led to destruction of the palatal alveolar bone and created a connection between oral and nasal cavity (Niemiec *et al.,* 2018). The most common location for an oronasal fistula is maxillar canine teeth (Niemiec *et al.,* 2018). Very deep pockets distopalatal to canine teeth and bleeding from nose after probing confirm the diagnosis (BSAVA, 2007). Periodontal abscesses can develop in deep pockets where food debris and bacteria have been trapped (Wiggs and Lobprise, 1997). They usually occur due to rapid worsening of chronic periodontitis (Wiggs and Lobprise, 1997).

Even at first stage, periodontitis should not be underestimated (Whyte *et al.,* 2014). Periodontitis is related to systemic health pathologies in organs such as the heart, liver, kidneys and lungs (Pavlica *et al.,* 2008; Cave *et al.,* 2012). In patients with gingivitis and periodontitis transient bacteremia have been demonstrated after chewing, tooth brushing and oral cavity surgical procedures (Pavlica *et al.,* 2008). Higher plaque grade is associated with reduction of platelets and increase in alanine aminotransferase (Whyte *et al.,* 2014). The bacteria from dental plaque possibly enters the bloodstream causing bacteraemia and migration all over the body (Whyte *et al.,* 2014). In their research Cave *et al*. (2012) found out that severity of the periodontitis is negatively associated with albumin, haemoglobin, haematocrit and aspartate aminotransferase and positively associated with total globulins, IgG and alanine aminotransferase. It seems that many non-oral conditions in dogs could be due to circulating inflammatory mediators, endotoxemia or repeated episodes of bacteremia originating from inflammated periodontium (Pavlica *et al.,* 2008). In conclusion, evidence of periodontitis influencing systemic health exists, but further investigation is needed to make pathogenesis and associations more clear (Pavlica and Nemec, 2010).

Home care is a cornerstone to control the disease, so it is very important to discuss this with the owner (Wiggs and Lobprise 1997). Home care consists of regular prevention of plaque accumulation and stabilizing the development of peridontitis (Harvey *et al.,* 2015). Daily teeth brushing is recommended to achieve the best prevention (Gorrel and Rawling, 1996;

Harvey *et al.*, 2015). In their study (1996), Gorrel and Rawling found out that brushing teeth every other day is insufficient to maintain healthy gingiva. According to Harvey *et al.* (2015), in addition to daily brushing also every other day have statistically significant difference in reduction of gingivitis, plaque and calculus accumulation compared to brushing less frequently or not at all.

Diet and chewing has also significant influence on oral health. Lymphadenopathy, dental deposits and periodontal disease occur significantly more often in dogs and cats fed with soft food compared to dry food (Gawor *et al.*, 2006). Giving a dog a dental chewing product daily, significant reduction on gingivitis, halitosis, plaque and calculus is reached in short term use (Quest, 2013). In long term use (up to 21 months), having a dental chew six times a week causes significant reduction on halitosis, plaque and calculus, but gingival scores did not have statistically significant results (Gorrel and Bierer, 1999). Also according to Gorrel and Rawling (1996), adding a daily chew has oral health benefits. Cats eating dry and soft food had higher prevalence of FORL comparing to cats eating only dry food (Pettersson and Mannerfelt, 2003). Mechanical action for teeth is the key in consuming the chew or eating food (Quest, 2013).

Products with chemical agents such as chlorhexidine gluconate have shown effect to prevent gingivitis (Wiggs and Lobprise, 1997). Dog and human plaque bacteria are different so products for human consumption may not be efficient or safe for dogs (Wallis *et al.*, 2015).

1.6 Malocclusions

Normal dentition of dog consists of following permanent teeth per one side of the mouth: 3 upper/3 lower incisors, 1 upper/1 lower canine, 4 upper/4 lower premolars and 2 upper/3 lower molars (Niemiec, 2012). The same for cats consists of 3 upper/3 lower incisors, 1 upper/1 lower canine, 3 upper/2 lower premolars and 1 upper/1 lower molars (Niemiec, 2012). The most common numbering system in veterinary dentistry is Triadan system, where each quadrant is numbered as follows: right upper = 100, left upper = 200, left lower = 300 and right lower = 400. Each tooth has own three-digit number considering quadrant and location of the teeth, beginning with 01 for the first incisor. Numbering continues from 01 to 10 on the canine maxilla and 01 to 11 on the canine mandible (Niemiec, 2012).

Normal occlusion consists of following criteria (Roux and Howard, 2010). The maxillary incisors are located rostrally to the mandibular incisors. The mandibular canine tooth is located in the interdental space between maxillary third incisor and canine teeth. The maxillary premolars don't contact mandibular premolars and form a zigzag. The crown cusps of the mandibular premolars are located in maxillary interdental spaces, rostrally to the corresponding maxillary premolar tooth. The maxillary fourth premolar is located lateral to mandibular fourth premolar and first molar teeth (Roux and Howard, 2010).

The definition for malocclusion in general is any deviation from normal occlusion (AVCD, 2018). It can be purely cosmetic or cause occlusal trauma (Niemiec *et al.,* 2018). Three features are evaluated: occlusion itself, position, size and shape of every tooth and the number of teeth present/absent (Roux and Howard, 2010).

There are very many different types of malocclusions, but in general they are divided into four groups from class 1 to 4 (AVDC, 2018). Class 1 is defined as normal jaw length but one or more teeth are out of alignment e.g. linguoversion, distoversion, mesioversion and palatoversion. Class 2 is defined as abnormal rostrocaudal relationship between upper and lower jaw, where mandibular jaw is caudal to its normal position. Class 3 is also defined as abnormal rostrocaudal relationship between upper and lower jaw, but mandibular jaw is rostral to its normal position (AVDC, 2018). This is often caused by line breeding and is considered normal in some breeds (Niemiec *et al.,* 2018). It can still cause gingival and tooth trauma. Class 4 is defined as asymmetry, in which one of the mandibles is shorter or longer than normal or positioned more dorsal or ventral than normal or loss of midline alignment of jaws exists (AVDC, 2018).

Retained deciduous tooth is very common condition in young small breed dogs. As soon as the permanent tooth erupts into the mouth, the deciduous tooth is considered persistent (Niemiec, 2012). The most commonly affected teeth are the canines. The main cause is incorrect eruption path of the permanent teeth (Niemiec, 2012). It may cause malocclusion to the permanent teeth (Roux and Howard, 2010). Retained deciduous tooth is indicated for exctraction when the permanent counterpart has erupted (Niemiec *et al.,* 2018).

1.7 Oral mass lesions

The fourth most common location for neoplasia in dogs and cats is the oral cavity (BSAVA, 2007). Benign changes e.g. hyperplastic lesions, cysts and granulomas may appear very similar and can rarely be differentiated from neoplastic lesions by only clinical examination (Verhaert, 2010). Common clinical signs are halitosis, hemorrhage, dysphagia, anorexia, loss of teeth, facial swelling, sneezing, pain, dyspnea or weight loss (Niemiec, 2012). To reach a definitive diagnosis and determine the degree of malignancy, biopsy and histopathological examination are mandatory (Verhaert, 2010).

Peripheral odontogenic fibroma is the most common type of benign tumour in the oral cavity in dogs (BSAVA, 2007). It arises from the periodontal ligament and creates localized swelling (Niemiec *et al.*, 2018). The treatment is surgical resection and depending on the size and location of the tumour, surrounding tissue removal might be needed (Verhaert, 2010). Other known benign odontogenic tumours are acanthomatous ameloblastoma, ameloblastoma, amyloid-producing odontogenic tumour and feline inductive odontogenic tumour (BSAVA, 2007).

Other than odontogenic origin tumours can also emerge in oral cavity. Viral papilloma is benign thickening of the oral mucosa and is common in young dogs (Niemiec *et al.*, 2018). Papillomas are usually self-limiting and might not need intervention at all. Other less commonly occurring benign non-odontogenic tumours are fibroma, lipoma, haemangioma, neurofibroma, chondroma and osteoma (BSAVA, 2007).

Non-odontogenic malignant tumours in oral cavity are common in dogs and cats. Among dogs the most common is malignant melanoma (Verhaert, 2010). Melanoma usually appears on the gingiva and alveolar mucosa in older dogs, but it may look similar to many other changes in oral cavity. Among cats, squamous cell carcinoma is the most common oral tumour (Niemiec *et al.*, 2018). Squamous cell carcinoma can arise from any mucosal surface but the most common location is sublingual in cats (BSAVA, 2007). It grows fast and the surface is often ulcerated. Squamous cell carcinoma is the second most common oral tumour in dogs (Verhaert, 2010). Prognosis is usually guarded or poor.

The second most common oral malignant tumour in cats and the third most common in dogs is fibrosarcoma (BSAVA, 2007). Fibrosarcomas can be detected in relatively young dogs and cats comparing to other oral malignancies (Verhaert, 2010). Defects are usually flat solid

masses which are attached deeply to other tissues and infiltrate aggressively (BSAVA, 2007). Therefore wide margins are needed if surgically excisioned. Other malignant tumours with oral locations are osteosarcoma, lymphoma and lymphosarcoma (BSAVA, 2007).

1.8 Dental hard tissue defects

Tooth and jaw fractures are common outcome of severe trauma. E.g. car accident, fighting with other animals, falls and blunt force trauma are common causes for jaw fracture (Zacher and Marretta, 2013). Temporomandibular joint luxation can also be a result of head trauma (Niemiec, 2012). To confirm the extent of tooth or jaw fracture radiographic imaging is mandatory (Schreyer, 2010). In case of crown fractures it should be noted whether the pulp is exposed or not (BSAVA, 2007). In recent fracture exposed pulpal cavity is seen as pink or red soft tissue at the fracture surface and it will bleed on probing (BSAVA, 2007). The fracture not exposing the pulp is called uncomplicated fracture and when the pulp is exposed, the fracture is called complicated (Schreyer, 2010). There are many treatment options for different situations and in some cases treatment needs to be started as soon as possible.

Tooth resorption (TR) is defined as hard tissue loss (Niemiec *et al.,* 2018). TR is very common in domestic cats and rare in dogs. TR can be diagnosed only by radiograpic imaging because the defects might not always be visible and it is also the only way to detect the extent and location of the lesions (Bellows, 2010). The lower third premolars are commonly the first locations to be affected by TR (Niemiec, 2012). According to the radiographic appearance, TR is divided into type 1 and 2 (Niemiec, 2012). Cats do not tend to show any overt clinical symptoms, which makes TR very hard to be detected by the owner (Niemiec, 2012). When dentin resorption has caused pulpal exposure, discomfort and pain are likely (Bellows, 2010). Uncommon other hard tissue defects in dogs and cats are enamel hypoplasia and hypocalcification, dental abrasion, dental attrition and primary endodontic lesion whereas caries only occurs in dogs (Niemiec, 2012).

2 AIMS OF THE STUDY

Aims of the study were to find out prevalence of different dental pathologies of dogs and cats in Estonia and which factors affect the prevalence. It is also important to know how much owners know about their pets' oral health and do they have enough knowledge about dental diseases, so they can book an appointment with the veterinarian in time when needed. In the study we want to find out where the owners get information about pets' dental care, is it enough to their opinion and where they would like to get it from.

In the study we want to find out answers to the following questions:

- Are pet owners able to estimate their pets' oral health?
- Do all these following factors have an influence on appearance of oral pathologies among dogs and cats: pet size, type of skull and age?
- How big part of patients coming to the veterinarian with some other primary complaint than dental issue has defects in oral health and should be evaluated for possible further treatment?

Hypothesis:

- Pet owners are not able to estimate their pets' oral health.
- Pet size, type of skull and age have influence on appearance of oral pathologies.
- 70% of the patients need further diagnostics of oral cavity.

3 MATERIALS AND METHODS

Study material was collected via paper questionnaire (Appendix 1), which was filled by veterinarians and pet owners at three different animal clinics in two different cities in Estonia: Eesti Maaülikool (EMÜ) small animal clinic in Tartu, Viljandi Männimäe small animal clinic in Viljandi and Janne Orro small animal clinic in Tartu. Awake intraoral examination was performed by a veterinarian. Teeth, gingiva and oral cavity were evaluated as thoroughly as the pet allowed to do it. Attention was paid to whether any gingivitis, stomatitis, plaque, calculus, persisting deciduous teeth, missing or mobile permanent teeth, dental defects, or malocclusions were discovered. The questionnaire included pictures and instructions to help the veterinarian in evaluation of occlusion. The pet owner filled the questionnaire, which included questions about their pets' dental care at home, how the owner estimates the pet's oral health, where the owner gets information about animal oral health and from where they would want to get it from.

In addition to the questions the questionnaire included basic information about the patient: age, species, the primary complaint for the visit, weight, ideal weight at adult age, skull type and whether the patient had had previous dental treatment or not. The aim was to fill the questionnaire for as many dogs and cats as possible coming to veterinarian. Because of the limited time at the small animal clinic, consent of the owner and many other practical reasons, every patient every day could not be included in the study.

Every questionnaire was given a number and filled in Microsoft Office Excel for statistical analyses. While starting to analyse the results, the patients who came to the veterinarian because of any dental issue as a primary complaint were left out from the study. In this study we wanted to find out especially the hidden problems and detect the prevalence of underlying oral pathologies. We felt that including patients with primary dental or oral complaints might have biased the study population towards higher prevalence and we wanted to highlight the prevalence of oral and dental disorders in the general population as a whole.

First, multiple correspondence analyses (MCA) were used to evaluate the correlations between the pathological findings found by the veterinarian and the owner's evaluation of the pet's oral health and oral related symptoms. MCA was conducted to assess the owners' cabability to evaluate their pets' oral health. Owner's evaluation of the pet's oral health,

tooth brushing and using products that support oral health were set as variables in the analysis, whereas pathologies found by veterinarian were set as supplementary variables.

The second MCA used in this study was to find correlations between risk factors and oral pathologies found by a veterinarian. Age, pet size and type of skull were chosen for risk factors. These features were chosen because of evidence in literature and assumption of all of them to have an influnece on the pathologies. If significant correlations occur, age, size and skull type are easily detectable features and special attention can be paid with these patients with higher risk. Oral pathologies were set as variables in the analysis, whereas the risk factors were set as supplementary variables.

Test value >1.95 was considered as statistically significant. Test value gives a variable correlation with corresponding axel. In this study, test values corresponding axel F1 have significantly more value at interpretation than test values corresponding axel F2 due to higher percentage. The total number of patients in MCA is smaller than total number in study, because if there was any relevant data missing, the patient was not included in the analysis. XLSTAT (Version 5.03, Addinsoft) statistical software was used for MCA analyses.

Both analyses were made separately between dogs and cats.

4 RESULTS

4.1 Basic information of patients

Total 471 questionnaires were filled by a veterinarian and 452 by owner. In EMÜ small animal clinic 52 questionnaires were filled between 16.6.-29.9.2017. In Viljandi Männimäe animal clinic 206 questionnaires were filled between 14.9.-13.10.2017. In Janne Orro animal clinic 213 questionnaires were filled between 11.9.-11.10.2017. If the primary complaint to visit the veterinarian was related directly to dental problem or consultation, it was left out of the study. Total 10 questionnaires were left out because of this reason and one was left out because the patient's species was unknown due to lack of information in the questionnaire. Total 460 (341 dogs and 119 cats) animals were included in this study.

Very various size of dogs were presented in the research: 11% of dogs' ideal adult weight was under 5 kg, 27% of dogs' was 5-10 kg, 24% of dogs' was 10-25 kg and 37% of dogs' ideal weight was over 25 kg. In cats, ideal weight was under 5 kg in 86% and over 5 kg in 14%.

Great variation was also seen in age: 37% of dogs were under 24 months old and 63% of the dogs were 24 months old or over. 49% of the cats were under 24 months old and 51% of the cats were 24 months old or over.

The main reason to visit a veterinarian was to get the pet vaccinated (40%), but also other reasons occurred: problems with skin and ears, examination of heart, anorexia and womiting, examination of skeleton with x-ray, spaying or neutering, diarrhea, control of blood samples, wounds, lameness, neoplasias, eye problems, problems with urinating, deworming, health check for senior pet and many others.

Pets' character, behaviour and possibilities of handling have a great influence on how well a awake intraoral examination can be carried out. In our research 46% of the dogs and 39% of the cats allowed the examination very well, 25% of the dogs and 41% of the cats allowed to do it partially and 16% of dogs and cats minimally. Fortunately only a minority, 12% of the dogs and 4% (n = 4) of the cats, did not allow for more than a very cursory examination.

Patients were divided into three groups based on the type of the skull: 80% of the dogs were mesocephalic, 18% were brachycephalic and 2% (n = 7) were dolichocephalic. In cats 94% were mesocephalic, 5% (n = 6) were brachycephalic and 1% (n = 1) was dolichocephalic.

Before attending this study, the owners reported that 10% of the dogs and 6% (n = 7) of cats had had a dental procedure under anaesthesia and 3% (n = 9) of dogs had had removal of calculus awake without anaesthesia.

4.2 Pathologies found in oral cavity and occlusion

The results are listed in Table 1. The most common disorders in oral cavity were plaque (dogs 52%, cats 49%), calculus (dogs 49%, cats 40%) and gingivitis (dogs 30%, cats 38%).

The results of occlusion are listed in Table 2. Occlusion was examined as thoroughly and carefully as the pet allowed to do it. Most of the patients (81%) allowed to evaluate the occlusion.

Table 1. Prevalence of pathologies found by veterinarian (dogs n = 336, cats n = 117)

	Dogs (number and percentage of positive findings)		Cats (number and percentage of positive findings)	
Gingivitis	102	30%	45	38%
Mucositis	15	4%	9	8%
Plaque	176	52%	57	49%
Calculus	165	49%	47	40%
Mobility of permanent teeth	8	2%	1	1%
Gingival recession and/or furcation exposure	33	10%	9	8%
Missing permanent teeth	37	11%	12	10%
Extra permanent teeth	0	0%	0	0%
Retained deciduous teeth	7	2%	1	1%
Enamel defect	63	19%	10	9%
Change in colour of teeth	26	8%	6	5%

Table 2. Occlusion evaluated by veterinarian (dogs n = 336, cats n = 117)

	Normal (number and percentage of positive findings)				Malocclusion (number and percentage of positive findings)				Don't know/can't be evaluated			
	Dogs		Cats		Dogs		Cats		Dogs		Cats	
Incisives	226	67%	98	84%	38	11%	1	1%	72	21%	18	15%
Canine and third incisive	230	68%	99	85%	32	10%	1	1%	74	22%	17	15%
Premolars	223	66%	92	79%	19	6%	1	1%	94	28%	24	21%
Upper fourth premolar and lower first molar	218	65%	88	75%	11	3%	0	0%	107	32%	29	25%

4.3 Patients in need of dental counseling or further diagnostics

Total 460 patients that came to a veterinarian with some other primary complaint than related to teeth or oral cavity were evaluated. Of these, in 75 patients veterinarian didn't find any oral pathology. The rest 385 (84%) had at least one oral pathology and have a reason to go at least for a counseling visit to a veterinarian who can evaluate the prognosis and whether treatment or more diagnostics is needed. The veterinarian can also give advice for possible home care or other preventive options.

4.4 Owner's part of the questionnaire

The owners had to evaluate the condition of their pets' mouth. In dogs, 55% of the owners answered that their pets' oral health is good, 40% answered that it is moderate and 6% (n = 19) answered that it is bad. Among the dog owners 40% had noticed halitosis, 39% had noticed plaque and calculus and 8% (n = 25) had noticed reddened gingiva. Only 7% (n = 21) of the dog owners hadn't looked in their pets' mouth at all.

In cats, 58% of owners thought their cats' oral health is good, 38% answered that it is moderate and 4% (n = 4) answered that it is bad. Among the cat owners 37% had noticed

halitosis, 14% had noticed plaque and calculus and 9% (n = 10) had noticed reddened gingiva. However, 23% of the cat owners hadn't looked in their pet's mouth at all.

Many different special diets and chewing products have been developed to reduce and prevent calculus formation. Majority (84%) of dog owners give their dogs these products, from which 27% give them daily, 42% give a couple times a week and 31% give less frequently. In cats, 35% of owners give their cats these products and 23% of them give the products daily, 33% give a couple times a week and 44% give less frequently.

In the Table 3 are listed where the owners purchase these products. Owners were asked to mark all suitable choices on the question. The most popular place is a pet store (64% among dog owners and 31% among cat owners).

Table 3. Where the owners purchase products that support oral health

	Dog owners (n = 329)		Cat owners (n = 114)	
Veterinarian	61	19%	5	4%
Pharmacy	20	6%	5	4%
Pet store	209	64%	35	31%
Supermarket	116	35%	13	11%
Web store	34	10%	0	0%

Almost one quarter (23%) of the dog owners brush their pet's teeth and 11% of those do it daily, 26% a couple times a week and 64% less frequently. Only one cat's teeth were brushed by its owner and it happened less than a couple times a week.

The infomation they have about dental care, diseases and treatment is sufficient evaluated by 85% of the dog owners and 79% of the cat owners. In the Table 4 are listed sources where the owners get information. Owners were asked to mark all suitable choices on the question. The most popular source of information is a veterinarian (dog owners 65% and cat owners 61%).

Almost all owners evaluate that the information has been helpful (93% of dog owners and 90% of cat owners). Still, 65% of the dog owners and 66% of the cat owners would like to

get more information about animals' oral health. In the Table 5 are listed sources where the owners would like to get more information. The most common source of wanted information is a veterinarian (dog owners 53% and cat owners 47%).

Table 4. Where the owners get information about animal dental and oral health and care

	Dog owners (n = 329)		Cat owners (n = 114)	
Veterinarian	215	65%	70	61%
Pharmacy	9	3%	2	2%
Pet Store	56	17%	22	19%
Other pet owners	76	23%	19	17%
Breeder	48	15%	0	0%
Books	43	13%	0	0%
Magazines	34	10%	14	12%
Internet	140	43%	44	39%

Table 5. Where the pet owners would like to get more information and counseling

	Dog owners (n = 329)		Cat owners (n = 114)	
Veterinarian	175	53%	54	47%
Pharmacy	23	7%	9	8%
Pet Store	58	18%	28	25%
Other pet owners	19	6%	7	6%
Breeder	18	5%	2	2%
Books	16	5%	9	8%
Magazines	16	5%	13	11%
Internet	65	20%	27	24%

4.5 Multiple correspondence analyses

In the first analyses, the oral pathologies found by the veterinarian were compared with symptoms discovered by the owner. Also using products that support oral health and teeth brushing were set as variables in MCA. Only one cat owner brushes pet's teeth, so brushing was left out from cats' analysis. All variables are listed in Table 6.

In Figure 1. two MCA axes accounted for 78.87% of the data variation in dogs (78.25% and 0.62% for dimensions 1 and 2 respectively). Most of the pathological findings in dogs are highly clustered on graphical display with brushing teeth, bad or moderate oral health and calculus and halitosis evaluated by the owner. The variables the owner doesn't look in pet's mouth and not using dental supportive products were apart from the other variables.

Test value >1.95 was considered as statistically significant. Several variables presenting the owner's cabability to evaluate their dog's oral health, such as presence of calculus or plaque (test value 13.7), oral health status (13.9), halitosis (7.8) and reddening of gingiva (5.3) were related to pathological findings by the veterinarian. Also brushing teeth (9.6) was related to pathological findings. The most related pathologies correlating with the owners' evaluation found by the veterinarian were calculus and/or plaque (7.5), gingivitis and mucositis (7.1) and attachment loss (4.5).

In Figure 2. the two MCA axes accounted for 76.58% of the data variation in cats (73.31% and 3.26% for dimensions 1 and 2 respectively). On graphical display all the variables presenting no pathology and no symptoms discovered by owner and good oral health status as evaluated by owner are plotted very close to each other. Positive findings are also clustered with bad oral health status, calculus and reddening of gingiva, which are evaluated by the owner. Neither F1 nor F2 correlated with usage of products that support oral health. Halitosis, using products and the owner looking in the pet's mouth are close to each other and have statistical correlation.

Several variables presenting the owners cabability to evaluate their cats oral health, such as presence of calculus or plaque (test value 7.1), oral health status (7.2), reddening of gingiva (6.3) and halitosis (6.2) were related to pathological findings by the veterinarian. The most related pathologies correlating with the owners' evaluation found by the veterinarian were calculus and/or plaque (4.3), missing permanent teeth (4.3) and attachment loss (3.8).

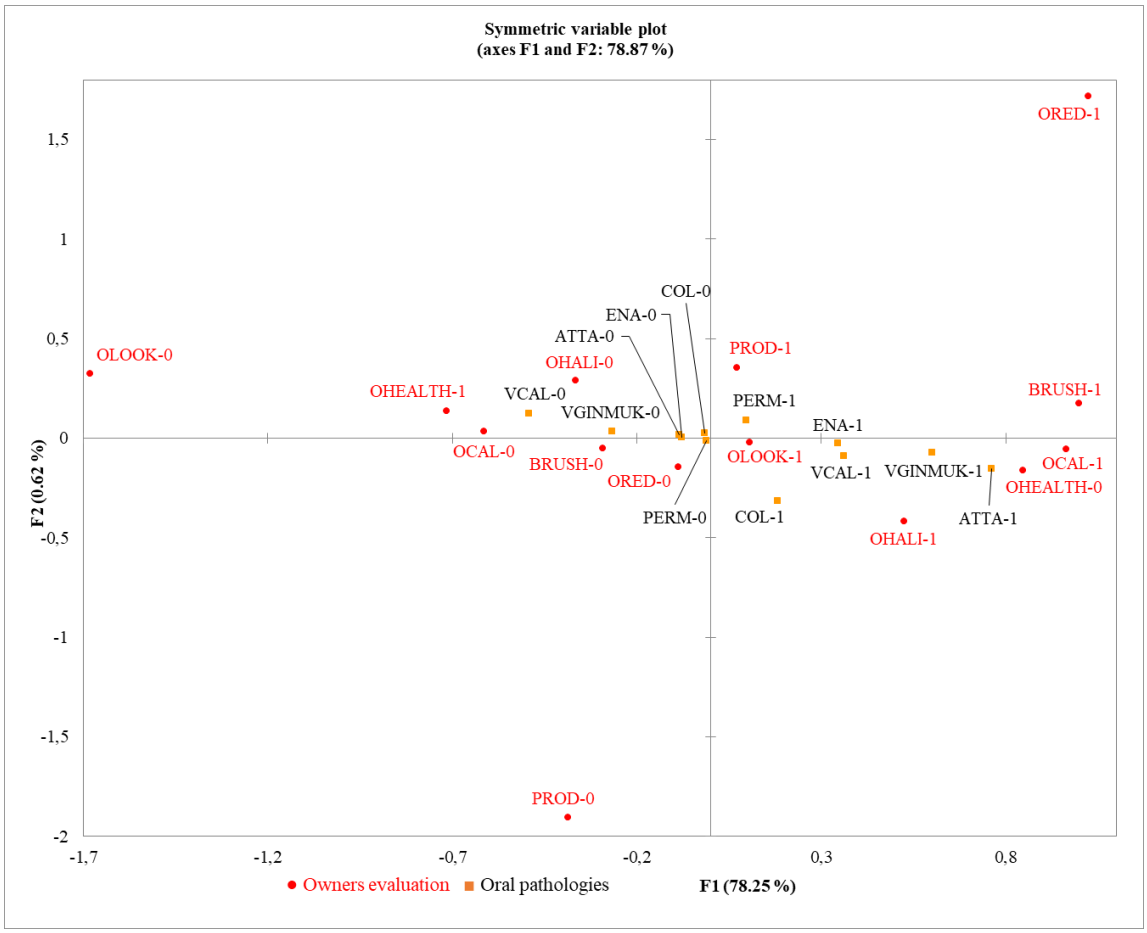

Figure 1. MCA of oral pathologies in dogs found by the veterinarian and the owner's evaluation (abbreviations of variables are explained in Table 6)

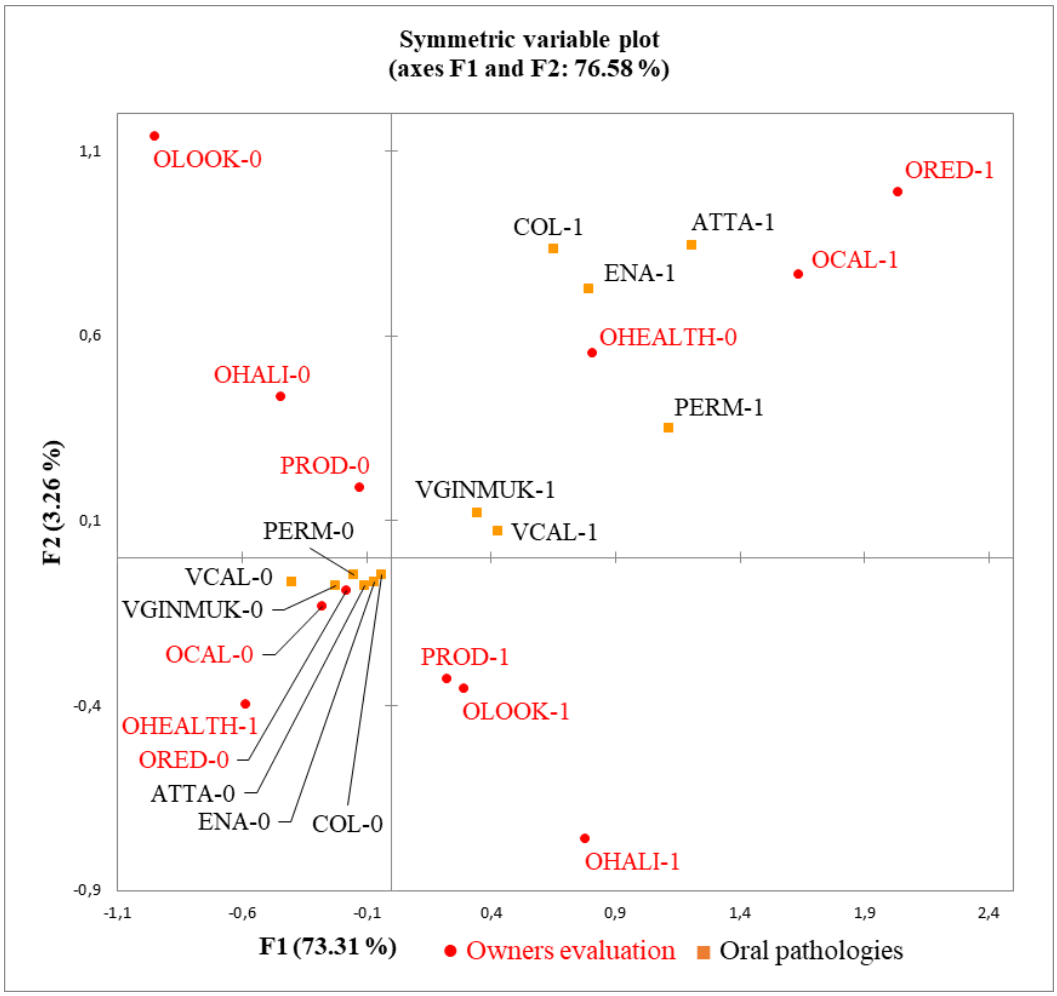

Figure 2. MCA of oral pathologies in cats found by the veterinarian and the owner's evaluation (abbreviations of variables are explained in Table 6)

Table 6. Descriptive characteristics of the variables of the owner's and veterinarian's findings

Variable	Definition	N dogs	N cats
Oral health status evaluated by owner (OHEALTH)	0 – Moderate or poor 1 – Good	146 173	46 65
Halitosis evaluated by owner (OHALI)	0 – No 1 – Yes	188 131	71 40
Plaque and/or calculus evaluated by owner (OCAL)	0 – No 1 – Yes	195 124	95 16
Reddened gingiva evaluated by owner (ORED)	0 – No 1 – Yes	294 25	102 9
Owner looks in pet's mouth (OLOOK)	0 – No 1 – Yes	19 300	26 85
Use of products that support oral health at home (PROD)	0 – No 1 – Yes	50 269	70 41
Brushing of teeth (BRUSH)	0 – No 1 – Yes	247 72	-
Gingivitis and/or mucositis evaluated by veterinarian (VGINMUK)	0 – Neither 1 – Yes, one or both	221 98	67 44
Plaque and/or calculus evaluated by veterinarian (VCAL)	0 – Neither 1 – Yes, one or both	135 184	58 53
Attachment loss evaluated by veterinarian (ATTA)	0 – None 1 – At least one of following: gingival recession, mobility of permanent tooth, furcation exposure	287 32	102 9
Missing permanent teeth evaluated by veterinarian (PERM)	0 – No 1 – Yes	285 34	98 13
Enamel defect evaluated by veterinarian (ENA)	0 – No 1 – Yes	260 59	102 9
Change in colour of teeth evaluated by veterinarian (COL)	0 – No 1 – Yes	294 25	73 5

In the second analyses, age, size and skull type were the three chosen risk factors which were compared with pathological findings. All variables are listed in Table 7.

In Figure 3. the two MCA axes accounted for 82.98% of the data variation in dogs (76.48% and 6.50% for dimensions 1 and 2 respectively). Variable tooth mobility was left out from the figure, because it was located so far from the other variables and because of small sample size it doesn't have statistically significant value. On graphical display pathologies in dogs are quite well clustered. Statistically very important variables are positive or negative finding of calculus, plaque and gingivitis by the veterinarian and they are strongly clustered with age. Retained deciduous teeth is more likely to occur with no other pathologies than with other positive findings.

Age over two years is a risk factor, which is the most correlated factor to oral pathologies in dogs (test value 8.2). The other strongly correlated risk factor is size under 10 kg (2.2). The most correlated pathologies with small size (under 10 kg) and higher age (over two years) are calculus (11.3), gingivitis (11.3) and plaque (11.1). Non-mesocephalic skull type has a weaker correlation according to axel F2 (4.5). According to axel F2 the most correlated pathologies with non-mesocephalic skull are missing permanent teeth (9.0), mobility of permanent tooth (8.5) and malocclusion (7.4).

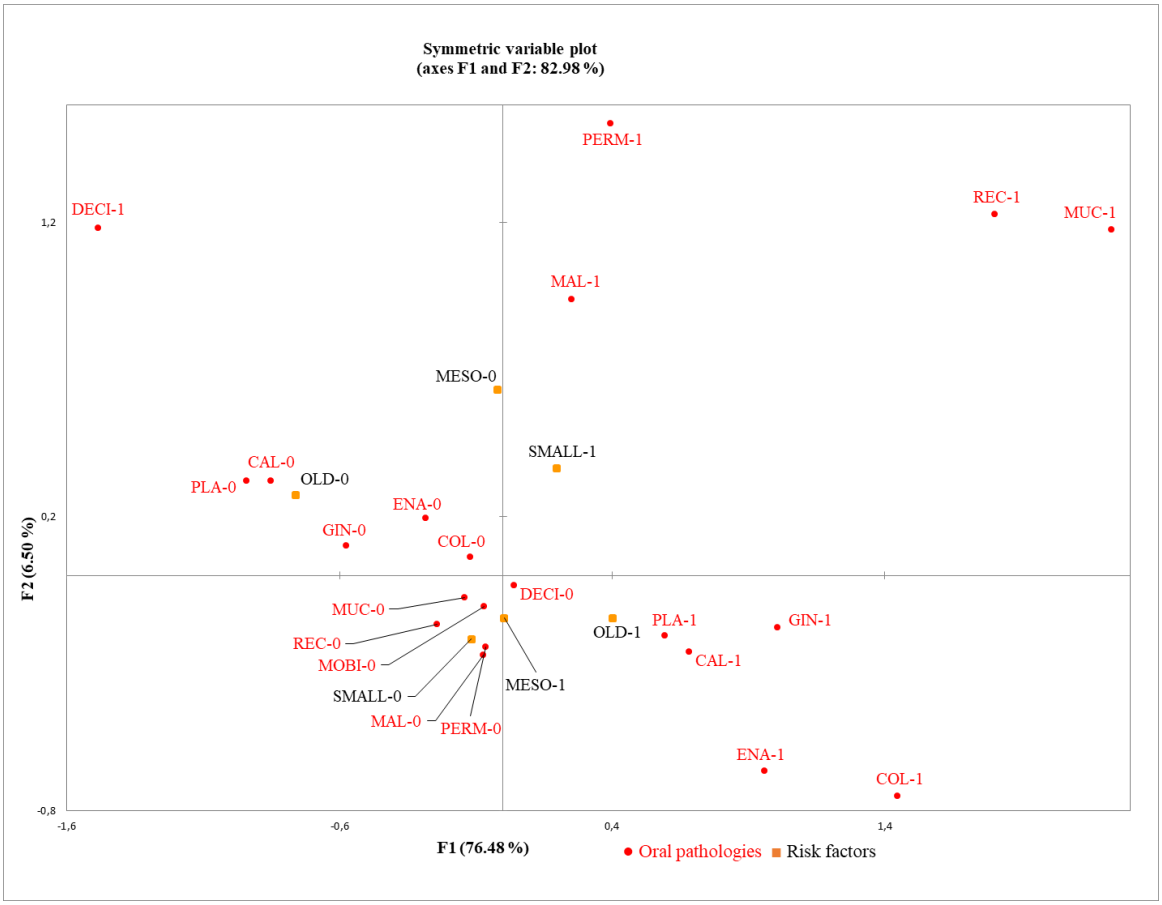

Figure 3. MCA of pathological findings in dogs and risk factors without variable tooth mobility (abbreviations of variables are explained in Table 7.)

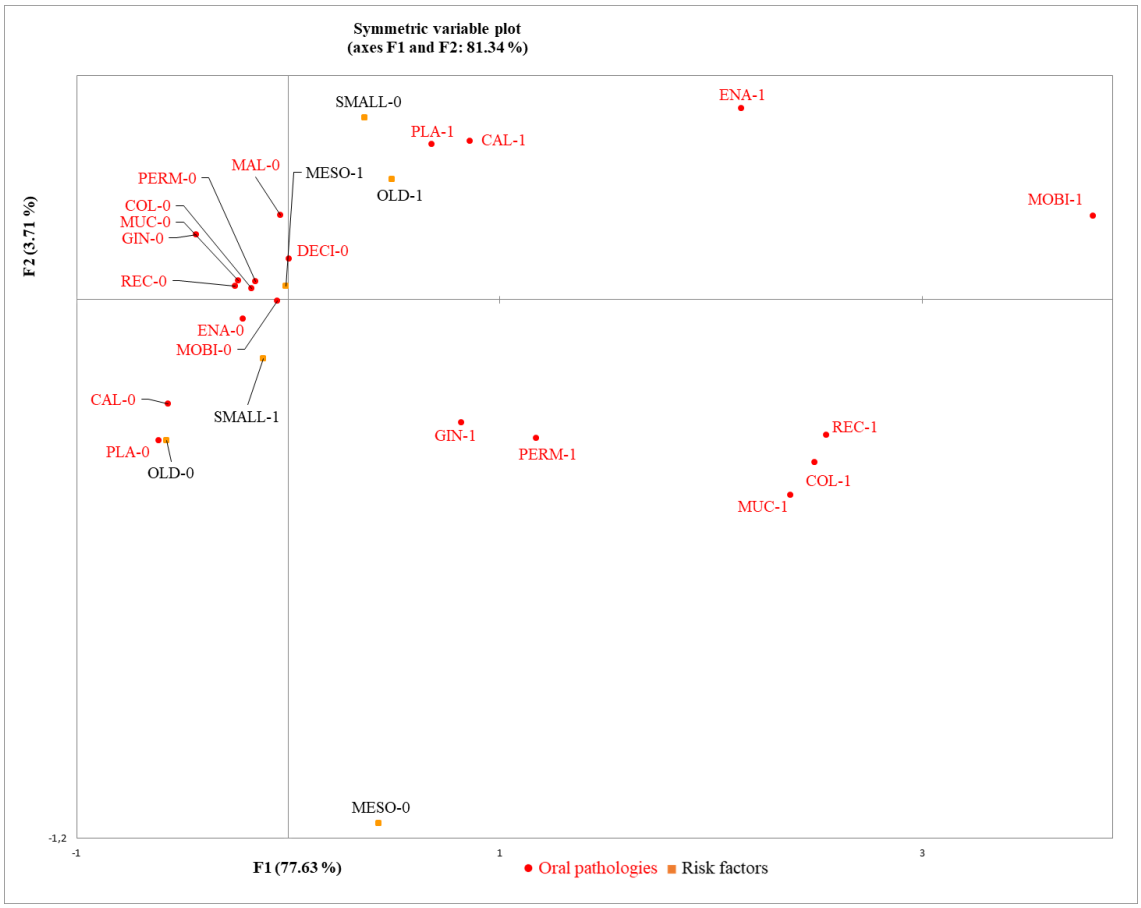

Figure 4. MCA of pathological findings in cats and risk factors without variables retained deciduous teeth and malocclusion (abbreviations of variables are explained in Table 7.)

Table 7. Descriptive characteristics of the variables of pathologies found by the veterinarian and riskfactors

Variable	Definition	n=dogs	n=cats
Gingivitis (GIN)	0 – No 1 – Yes	140 80	51 27
Mucositis (MUC)	0 – No 1 – Yes	207 13	71 7
Plaque (PLA)	0 – No 1 – Yes	85 135	41 37
Calculus (CAL)	0 – No 1 – Yes	98 122	47 31
Mobility of permanent teeth (MOBI)	0 – No 1 – Yes	213 7	77 1
Gingival recession and/or furcation exposure (REC)	0 – No 1 – Yes	194 26	71 7
Missing permanent teeth (PERM)	0 – No 1 – Yes	190 30	69 9
Retained deciduous teeth (DECI)	0 – No 1 – Yes	214 6	77 1
Enamel defect (ENA)	0 – No 1 – Yes	170 50	71 7
Change in colour of teeth (COL)	0 – No 1 – Yes	203 17	73 5
Malocclusion (MAL)	0 – No malocclusions detected 1 – At least one defect on occlusion	171 49	74 4
Age (OLD)	0 – <24 months old 1 – ≥24 months old	76 144	36 42
Size (SMALL)	0 – Ideal weight dogs >10 kg, cats >5kg 1 – Ideal weight dogs <10kg, cats <5kg	138 82	19 59
Skull type (MESO)	0 – Brachycephalic and dolichocephalic breeds 1 – Mesocephalic breeds	41 179	2 76

In Figure 4. the two MCA axes accounted for 81.34% of the data variation (77.63% and 3.71% for dimensions 1 and 2 respectively). Variables retained deciduous teeth and malocclusion were left out from the figure, because they were located so far from the other variables and because of a small sample size they don't have statistically significant value. On graphical display pathologies in cats are very clustered, especially negative findings. Also in cats, occurrence of plaque and calculus is strongly clustered with older age (over two years) but also with bigger size (over 5 kg). Positive findings of gingival recession and/or furcation exposure, mucositis and colour change are very clustered.

Higher age (over two years) is a riskfactor, which is most related to oral pathologies in cats (test value 4.7). The most correlated pathologies with age over two years are gingival recession and/or furcation exposure (7.0), mucositis (6.5) and calculus (6.1). Also bigger size (over 5 kg) has a weak relation according to axel F2 (2.0). Cats' skull type is not related to oral pathologies. According to axel F2 the most correlated pathologies with bigger size (over 5 kg) are malocclusion (7.1) and retained deciduous teeth (7.0). However, making conclusions from retained deciduous (n = 1) teeth, skull type (non-mesocephalic breed n = 2) and malocclusion (n = 4) might be misleading because of such a small sample size and uneven distribution of the results.

5 DISCUSSION

Questionnaires were filled by many different veterinarians. The veterinarian with special interest in small animal dentistry gave them instructions on how to fill the forms and how to perform a proper awake dental examination. Still, many values in the questionnaire are subjective and that fact brings a little variation to the results. There are electronic patient programmes in Estonia, but it is not very common to register all diagnoses, especially if the dental problem is not the primary complaint. Using the existing database could have resulted in underestimation of prevalence of dental disorders and that is why paper form was chosen for this study. The form was made to collect as much valuable information as possible in a reasonable time, which is why we didn't include any indices (e.g. gingivitis, calculus) in the questionnaire. Because of these features, the questions in the form were mostly simple yes/no questions. The data is collected from three different clinics from two cities in Southern Estonia. Division into groups by age, size and skull type represent very well the population of dogs and cats in Estonia. We had a large sample size (460 animals) and the results can be generalised to Estonia and maybe to the neighboring countries, where the lifestyle and keeping animals are similar.

To diagnose dental disease mostly requires procedures like measuring periodontal pockets and gingival recession or radiological imading (Kortegaard *et al.*, 2014). These procedures require at least sedation, usually anaesthesia (Kortegaard *et al.*, 2014). Awake dental examination is usually mainly for evaluation of defects, symptoms and risks, but it gives much valuable information to decide if more diagnostics is needed. Very few diseases can be properly diagnosed only by a visible evaluation on awake patient.

Our first hypothesis was that the owners are not able to evaluate their pets' oral health. The major finding is that the owners actually are able to evaluate their pets' oral condition quite well. Many of the veterinarian's findings had statistical correlation with symptoms discovered by the owners. However, even if the owners have detected halitosis or calculus, do they know that the problem possibly needs treatment? If the pet doesn't show any pain, one may ignore the findings. That's the point where instructing the owner is extremely important. In our study, 85% of the dog owners and 79% of the cat owners think the information about dental care and diseases has been sufficient. On the other hand, 65% of the dog owners and 66% of the cat owners would like to get more information. This is evidence that the owners are motivated and interested in taking care of their pets' teeth. The

most (65%) of the dog owners get information from a veterinarian but the second and third most popular sources are internet (43%) and other dog owners (23%). Those can be a good way to share knowledge, but also incorrect information can spread very quickly. Unfortunately, only 53% of the dog owners and 47% of the cat owners would like to get more information from a veterinarian. This is why the veterinarians should pay even more attention to especially puppy and kitten owners and to give them proper instructions and maybe warn them to be extra critical about information they receive anywhere else. There is still a lot of owners, especially cat owners (23%), who don't even look in their pets' mouth. In my opinion, it is mostly due to lack of knowledge.

The second hypothesis was that pet size, type of skull and age have an influence on appearance of oral pathologies. Higher age had statistically significant correlation on oral pathologies in dogs and cats, which is also proven in literature (Harvey *et al.*, 1994; Butkovic *et al.*, 2001; Ingham and Gorrel, 2001; Kortegaard *et al.*, 2008). Many oral disorders are chronic and over a long period of time hidden problems can get worse unnoticed. Some owners might even think that some defects are normal signs of increasing age.

Small size (under 10 kg) was a clear risk factor in dogs. Periodontitis is known to be more frequent among small dogs than big ones (Harvey *et al.*, 1994). Miniature dogs can be prone to problems with crowding of teeth, which again can lead to different problems. Small dogs can also have different dietary and chewing habits compared to bigger dogs. Some dental pathologies are thought to be inherited and that can elevate the occurrence of pathologies among different breed populations.

In the questionnaire dogs and cats were divided into three groups: mesocephalic, brachycephalic and dolichocephalic. In the statistical analyses they had to be put in two groups: mesocephalic and non-mesocephalic. There were only few dolichocephalic dogs and cats in the study, so pets in non-mesocephalic group are mostly brachycephalic. Dogs non-mesocephalic skull type had only a weak correlation with pathologies. Brachycephalic dogs are known to have malocclusions due to very exaggerated skull shape. Occlusion couldn't be evaluated in all patients in the study and if any information was missing, the patient was left out from MCA. This might have an influence on the results. Skull type didn't have any correlation with pathologies in cats, but because of small sample size the result can be misleading.

The third hypothesis was that 70% of the patients need further diagnostics. In this study 84% of the patients had at least one pathology found by a veterinarian. It is a very high prevalence and supports the theory that dental problems are very common (Lund *et al.,* 1999; Pettersson and Mannerfelt, 2003; O'Neill *et al.* 2014). In their study, Kyllar and Witter (2005) found dental alterations in 85.3% of randomly selected dogs, the prevalence being very close to our result. Not all changes require massive surgeries or mean that the pet is in severe pain, but consultation with a veterinarian and evaluation for need of further diagnostics is very recommendable. Prognosis for pathology can also be evaluated and home care and prevention advice can be given.

Information and advertising has reached most of the owners and many buy products with various claims of supporting oral and dental health (dog owners 84%) to prevent calculus formation. On the graphical display (Figure 2.) it can be seen, that if a cat owner looks in the cat's mouth, halitosis can be detected and products that support oral health are given. This also proves they are interested in increasing their pets' health. Unfortunatelly, according to our MCA, products that support oral health didn't have clinical relevance. Very good effect on oral health have been achieved with specific chewing products in different studies (Gorrel and Bierer, 1999; Quest, 2013). Our results are likely due to starting the use of the products too late, being used too infrequently or using ineffective products. Some owners may include many products as supporting oral health even if the product doesn't have any scientific proof. Some companies advertise their products that support oral health with claims of decreasing signs of dental and oral diseases. The owners should be emphasized that sometimes only suppressing some signs does not mean that the oral health is restored. The primary cause should be discovered and treated, not the symptom.

If the teeth are brushed less frequently than daily (Gorrel and Rawling, 1996) or less frequently than every other day (Harvey *et al.,* 2015), it doesn't have any influence on oral welfare at all. According to our results of MCA, brushing the teeth was positively correlated to oral pathologies. This is very likely because brushing has been started too late in the timeframe of the disease progression, not as a preventative measure in a healthy mouth, and brushing is performed infrequently or inefficiently so it doesn't have clinical benefit. In this case, brushing is more a reaction to a problem in oral cavity than a way of preventing disease. Almost a quarter (23%) of dog owners brush their pets' teeth, and only 11% of them does it daily. In a poll in Canada (Anonymus, 2016), 57% of the dog owners and 27% of the cat owners brush their pets' teeth. On the other hand, only 8% of all dog owners and 4% of all

cat owners brush their pets' teeth at least daily (Anonymus, 2016). The owners just might need a little bit more couragement and counceling on the importance of brushing the pets' teeth regularly so the number could be raised. Brushing teeth daily is recommended to maintain oral health (Gorrel and Rawling, 1996; Harvey *et al.*, 2015). Cats might be harder to teach to tolerate the brushing, but also the knowledge about the importance of brushing may not have reached the majority of the cat owners. The positive side is that when the owners have discovered problems e.g. halitosis and calculus, they are trying to do something about it by brushing the teeth, which can be seen in Figure 1. In addition, in case of halitosis and calculus, the owners evaluate that their pet's oral health status is bad and the veterinarian detects pathologies (Figure 1). This proves again that most of the owners are honest and can evaluate the oral health status of their pet.

In our study the prevalence of gingivitis is 30% in dogs and 38% in cats and the prevalence of calculus is 49% in dogs and 40% in cats. In a very large sample study in U.S prevalences of gingivitis were 19.5% in dogs and 13.1% in cats and prevalences of calculus were 20.5% in dogs and 24.2% (Lund *et al.*,1999). On the other hand, Kyllar and Witter (2005) found in their research the prevalence of calculus 61.3% in dogs. Prevalences vary quite a lot in different studies depending on sample size, location, year of study and how the sample has been collected. In any case, gingivitis and calculus are common in dogs and cats and must be paid attention to.

Further research is needed especially in cats with a bigger sample size to make conclusions of correlations between pathologies, the owners' evaluations and risk factors. To find out whether a certain skull type really is a risk factor for malocclusion, a bigger sample size would also be needed on both cats and dogs.

6 CONCLUSIONS

Dental diseases are very common in dogs and cats. It would be very important to get problems detected as early as possible to give better treament in time with better prognosis. To detect the problems, intraoral examination should always be a part of general clinical examination. Only that way risks can be evaluated and further diagnostics can be performed if needed. Instructing the owners and sharing information about animal oral health is also very important and home care advice for prevention is a cornerstone in many diseases.

Our hypothesis that 70% of the patients have at least one pathology turned out to be a little underestimated. In 385 (84%) patients a veterinarian found at least one pathology and hence there is reason to go at least for a counseling visit to a veterinarian who can evaluate whether more diagnostics is needed.

Risk factors age, size and skull type were expected to have an influence on occurrence of oral pathologies. The age over two years was definitely confirmed to have an influence in dogs and cats. In dogs' size under 10 kg also had statistically significant influence. Size over 5 kg in cats and non-mesocephalic skull type in dogs had a weak correlation with oral pathologies. In cats, skull type did not have any correlation with oral pathologies.

Against our hypothesis, the owners are able to evaluate their pets' oral welfare.

Prevalence of indicators of dental diseases in dogs and cats: risk factors for oral pathology and correlation of owner perception with clinical examination findings

SUMMARY

Different dental diseases in dogs and cats are very common and many of them are treatable. Untreated dental diseases might cause e.g. discomfort, pain or dysphagia. The aim of this study was to find out the prevalence of dental pathologies in dogs and cats in Estonia and which are the risk factors for high prevalence in these pathologies. This information could be used during first-opinion consultations to detect the possible dental patients easier among all patients coming to animal clinic and redirect them for consultation, evaluation for prognosis and further diagnostics if needed. Knowledge of dental diseases and home care among pet owners is also very important, since it is the owners who bring the pets to the animal clinic. The other aim was to find out if the owners are able to evaluate their pets' oral welfare correctly. Material for the study was collected via a questionnaire, which was filled in by veterinarians and owners in three different animal clinics in Estonia. We included 460 animals' in the research. The veterinarian conducted an awake intraoral examination. The owners answered questions about their pets' dental care at home, the source where they have received knowledge of animal dental diseases and their wishes for where to get it from. In addition, the owner was asked to evaluate their pet's oral welfare.

The most seen pathologies in oral cavity were plaque (dogs 52% and cats 49%), calculus (dogs 49% and cats 40%) and gingivitis (dogs 30% and cats 38%). Malocclusions occurred in incisors (dogs 11% and cats 1%), I3 and canines (dogs 10% and cats 1%) and premolars (dogs 6% and cats 1%). At least one dental or oral pathology occurred in 84% of patients and for them it is recommendable to book an appointment with a veterinarian to evaluate the need of further diagnostics and preventive treatment and to get instructions for home care. Risk factors for oral pathologies in dogs are higher age (over two years) and small size (under 10kg). Risk factor for oral pathologies in cats is higher age (over two years). Bigger size (over 5kg) in cats and brachycephalic or dolichocephalic skull type in dogs have a weak correlation with oral pathologies. Based on this study owners are able to correctly evaluate their pets' dental welfare. The owners' evaluations have statistically significant correlation with veterinarian's findings.

REFERENCES

Albuguergue C., Morinha F., Requicha J., Martins T., Dias I., Guedes-Pinto H., Bastos E., Viegas C. (2012). Canine periodontitis: The dog as an important model for periodontal studies. The Veterinary Journal 191: 299-305.

American Veterinary Dental College (AVDC) https://www.avdc.org/Nomenclature/Nomen-Occlusion.html#occ-normal, accessed 16.5.2018.

Anonymus (2016). Most (95%) Pet Owners Brush Their Own Teeth Daily, But Few Brush Their Dog's (8%) or Cat's (4%) Teeth on a Daily Basis. https://www.ipsos.com/en-ca/news-polls/most-95-pet-owners-brush-their-own-teeth-daily-few-brush-their-dogs-8-or-cats-4-teeth-daily-basis, accessed 21.5.2018.

Bannon K.M. (2013). Clinical Canine Dental Radiography. Veterinary Clinic of North America: Small Animal Practice 43: 507-532.

Bellows J. (2010). Feline Dentistry: Oral Assessment, Treatment and Preventative Care. Wiley-Blackwell. pp. 222-226.

BSAVA Manual of Canine and Feline Dentistry (2007). /Eds. Tutt C., Deeprose J., Crossley D. (3rd edn.). British Small Animal Veterinary Association.

Butkovic V., Simpraga M., Sehic M., Stanin D., Susic V., Vapak D., Kos J. (2001). Dental diseases of dogs: a retrospective study of radiological data. Acta Veterinaria Brno 70: 203-208.

Cave N.J., Bridges J.P., Thomas D.G. (2012). Systemic effects of periodontal disease in cats. Veterinary Quarterly 32: 131-144.

Fulton A.J., Fiani N., Verstraete F.J.M. (2014). Canine Pediatric Dentistry. Veterinary Clinic of North America: Small Animal Practice 44: 303–324.

Gawor J.G., Reiter A.M., Jodkowska K., Kurski G., Wojtacki M.P., Kurek A. (2006). Influence of Diet on Oral Health in Cats and Dogs. The Journal of Nutrition 136: 2021S-2023S.

Gorrel C., Bierer T.L. (1999). Long Term effects of a Dental Hygiene Chew on the Periodontal Health of Dogs. Journal of Veterinary Dentistry 16: 109-111.

Gorrel C., Rawlings J.M. (1996). The role of tooth-brushing and diet in the maintenance of periodontal health in dogs. Journal of Veterinary Dentistry 13: 139-146.

Harvey C.E., Shofer F.S., Laster L. (1994). Association of age and body weight with periodontal disease in Northamerican dogs. Journal of Veterinary Dentristry 11: 94-105.

Harvey C., Serfilippi L., Barnvos D. (2015). Effect of Frequency of Brushing Teeth on Plaque and Calculus Accumulation, and Gingivitis in Dogs. Journal of Veterinary Dentistry 32: 16-21.

Heaton M., Wilkinson J., Gorrel C., Butterwick R. (2004). A rapid screening technique for feline odontoclastic resorptive lesions. Journal of Small Animal Practice 45: 598–601.

Ingham K.E., Gorrel C. (2001). Effect of long-term intermittent periodontal care on canine periodontal disease. Journal of Small Animal Practice 42: 67-70.

Klein T. (2000). Predisposing Factors and Gross Examination Findings in Periodontal Disease. Clinical Techniques in Small Animal Practice 15: 189-196.

Kortegaard H.E., Eriksen T., Baelum V. (2008). Periodontal disease in research beagle dogs – an epidemiological study. Journal of Small Animal Practice 49: 610--616.

Kortegaard H.E., Eriksen T., Baelum V. (2014). Screening for periodontal disease in research dogs – methodology study. Acta Veterinaria Scandinavica 56: 77.

Kyllar M., Witter K. (2005). Prevalence of dental disorders in pet dogs. Veterinarni Medicina 50: 496-505.

Lewis J.R. (2013). Therapeutic Decision Making and Planning in Veterinary Dentristry and Oral Surgery. Veterinary Clinic of North America: Small Animal Practice 43: 471-487.

Lund E.M., Armstrong P.J., Kirk C.A., Kolar L.M., Klausner J.S. (1999). Health status and population characteristics of dogs and cats examined at private veterinary practices in the United States. Journal of the American Veterinary Medical Association. 214: 1336–1341.

Niemiec B.A., Gawor J., Nemec A., Clarke D., Tutt C., Gioso M., Stegall P., Chandler M., Morgenegg G., Jouppi R, Stewart K. (2018). World Small Animal Veterinary Association Global Dental Guidelines http://www.wsava.org/Guidelines/Global-Dental-Guidelines, accessed 24.5.2018

Niemiec B.A. (2012). Small Animal Dental, Oral and Maxillofacial Disease. Taylor & Francis Group

Niemiec B.A. (2013). Veterinary Periodontology. John Wiley & Sons, Inc.

O'Neil D.G., Church D.B., McGreevy P.D., Thomson P.C., Brodbelt D.C. (2014). Prevalence of disorders recorded in cats attending primary-care veterinary practices in England. The Veterinary Journal 202: 286-291.

O'Neil D.G., Church D.B., McGreevy P.D., Thomson P.C., Brodbelt D.C. (2014). Prevalence of Disorders Recorded in Dogs Attending Primary-Care Veterinary Practices in England. PLOS ONE 9: 1-16.

Pavlica Z., Nemec A. (2010). Periodontal Disease from the whole Body Perspective. European Journal of Companion Animal Practice 20: 236-240.

Pavlica Z., Petelin M., Juntes P., Erzen D., Crossley D.A., Skaleric U. (2008). Periodontal Disease Burden and Pathological Changes in Organs of Dogs. Journal of Veterinary Dentistry 25: 97-105.

Pettersson A., Mannerfelt T. (2003). Prevalence of Dental Resorptive Lesions in Swedish Cats. Journal of Veterinary Dentistry 20: 140-142.

Quest B.W. (2013). Oral Health Benefits of a Daily Dental Chew in Dogs. Journal of Veterinary Dentistry 30: 84-87.

Robinson N.J., Dean R.S., Cobb M., Brennan M.L. (2016). Factors influencing common diagnoses made during first-opinion small-animal consultations in the United Kingdom. Preventive Veterinary Medicine 131: 87-94.

Roux P., Howard J. (2010). The evaluation of dentition and occlusion in dogs. European Journal of Companion Animal Practice 20: 241-251.

Schreyer J. (2010). Management of tooth fractures. European Journal of Companion Animal Practice 20: 230-235.

Thomas S., Lappin D.F., Spears J., Bennett D., Nile C., Riggio M.P. (2017). Prevalence of feline calicivirus in cats with odontoclastic resorptive lesions and chronic gingivostomatitis. Research in Veterinary Science 111: 124-126.

Verhaert L. (2010). Oral Proliferative Lesions in the Dog and Cat. European Journal of Companion Animal Practice 20: 252-264.

Verstraete F.J.M., van Aarde R.J., Nieuwoudt B.A., Mauer E., Kass P.H. (1996). The Dental Pathology of Feral Cats on Marion Island, Part 1: Congenital, Developmental and Traumatic Abnormalities. Journal of Comparative Pathology 115: 265-282.

Verstraete F.J.M., van Aarde R.J., Nieuwoudt B.A., Mauer E., Kass P.H. (1996). The Dental Pathology of Feral Cats on Marion Island, Part 2: Periodontitis, External Odontoclastic Resorption Lesions and Mandibular Thickening. Journal of Comparative Pathology 115: 283-297.

Wallis C., Marshall M., Colyer A., O'Flynn C., Deusch O. (2015). A longitudinal assesment of changes in bacterial community composition associated with the development of periodontal disease in dogs. Veterinary Microbiology 181: 271-282.

Whyte A., Bonastre C., Monteagudo L.V., Les F., Obon J., Whyte J., Tejedor M.T. (2014). Canine stage 1 periodontal disease: A latent pathology. The Veterinary Journal 201: 118-120.

Wiggs R.B., Lobprise H.B. (1997). Periodontology, in Veterinary Dentistry, Principals and Practice: Philadelphia, Lippincott Raven, pp 186-231.

Zacher A.M, Marretta S.M. (2013). Oral and Maxillofacial Surgery in Dogs and Cats. Veterinary Clinic of North America: Small Animal Practice 43: 609-649.

Suuõõne ja hammastiku haigustele viitavate kliiniliste tunnuste esinemine koertel ja kassidel: suuõõne patoloogia riskifaktorid ja omanikupoolse hinnangu seos kliinilise läbivaatuse leidudega

KOKKUVÕTE

Erinevad kasside ja koerte hambahaigused on tänapäeval levinud ja väga paljusid neist on võimalik ravida. Ravimata hambahaigused võivad põhjustada ebamugavust, valu ning söömisraskusi. Töö eesmärgiks oli saada teada kui palju hambahaigustele omaseid tunnuseid esineb koertel ja kassidel Eestis ning mis oleks riskifaktorid hambahaiguste esinemisele et teada, millele rohkem tähelepanu pöörata tavapraktikas. Selle abil võiks leida kergemini patsiente, kes vajaksid edasist konsultatsiooni, prognoosi hindamist ning vajadusel edasist diagnoosimist. Ka omanike teadmised on väga tähtsad, kuna nad toovad nende lemmikud loomaarsti juurde kui oskavad probleeme õigeaegselt avastada. Uuringus tahtsime selgitada kui hästi omanikud oskavad lemmiku suu tervist hinnata.

Uuringu andmed koguti küsitluse abil, mis täitsid loomaarstid ning loomaomanikud kolmes erinevas kliinikus Eestis. Uuringus kasutati 460 looma andmeid. Loomaarst teostas ärkvel suuõõne ülevaatuse. Omanik vastas küsimustele nende koduse hambahoolduse kohta ning tema teadmistest hambahaiguste kohta ja soovidest infomatsiooni saamise kohta. Lisaks omaniku paluti hinnata tema lemmiku suu olukorda.

Kõige rohkem esinevad patoloogiad olid hambakatt (koertel 52% ja kassidel 49%), hambakivi (koertel 49% ja kassidel 40%) ning gingiviit (koertel 30% ja kassidel 38%). Maloklusioone esines intsisiivides (koertel 11% ja kassidel 1%), I3 ning kihvades (koertel 10% ja kassidel 1%) ning premolaarides (koertel 6% ja kassidel 1%). Suuremal osal loomadest (84%) esines vähemalt üks suuõõne patoloogia ehk nendel oleks väga soovitatav käia loomaarsti konsultatsioonil et hinnata edasise diagnostika vajadust ja võimalusel anda ennetavat ravi ja koduse hoolduse juhendeid.

Riskifaktoriteks suuõõne patoloogiate esinemisele on kõrge vanus koertel ja kassidel (üle kaks aastat) ning väike suurus koertel (alla 10 kg). Nõrk korrelatsioon patoloogiatele oli kassidel suurus (üle 5 kg) ning koertel mitte-mesokefaalne kolju tüüp. Selle uuringu põhjalt omanikud oskavad hinnata looma suu tervist. Enamusel langeb hinnang kokku loomaarsti leidudega.

APPENDICES

Appendix 1. Questionnaire for owner and veterinarian

Patsiendi ID	**……/……/……** *kliiniku ID / kuup. ppkkaa / patsiendi ID kliinikus*
Esmane kliinikusse pöördumise põhjus	
Vanus	.....aastat .....kuud VÕI sünniaeg ...../...../.....(pp/kk/aaaa)

	Esmane visiit
	Kordusvisiit

	KOER
	KASS

ristita tabelis sobiv

KAAL VISIIDIL.....kg

Ideaalkaal täiskasvanuna:

	<5 kg
	5-10 kg
	10-25 kg
	>25 kg

Patsiendi koostöövalmidus – suuõõne läbivaatust lubas patsient teha:

	väga hästi (võimalik hästi hinnata kogu suu seisundit, ka suuõõne tagaosa)
	osaliselt (võimalik peamiselt suuõõne eesosa ja hammaskaare välimise külje vaatlus)
	minimaalselt (võimalik pealiskaudne, lühiajaline peamiselt kihvade/premolaaride ala hindamine)
	ei saanud üldse suhu vaadata (sel juhul palun täita ainult omanikuküsitluse osa)

Kas patsiendile on loomaarstile või omanikule teadaolevalt kunagi teostatud loomaarsti poolt läbiviidavat üldanesteesias suuõõne protseduuri (hambakivi eemaldus, hammaste eemaldus vms)?		**JAH**
		EI
Kas patsiendile on loomaarstile või omanikule teadaolevalt kunagi teostatud nn. ärkvel (ilma anesteesiata) hambakivi eemaldamist?		**JAH**
		EI

Kolju/pea tüüp		Mesokefaalne e. keskpealine – nö. tavatüüp – nt. saksa lambakoer, euroopa kodukass
		Brahhükefaalne e.lühipealine – lai pea lühikese koonuosaga – nt. mops, pärsia kass
		Dolihhokefaalne e. pikapealine – kitsas, pika koonuga pea – nt. hurdad, orientaal või uuem siiami kass

PATSENDI ID: ……/……/……

Leiud suus (valige EI ka siis, kui antud leiu esinemist ei olenud võimalik hinnata):

Gingiviit e. igemepõletik (piki hammaskaart paikneva igemekoe punetus ja/või turse ja/või veritsus)		**JAH**
		EI
Mukosiit e. suu limaskesta põletik (suu ülejäänud limaskesta punetus, turse, veritsus)		**JAH**
		EI
Hambakatt		**JAH**
		EI
Hambakivi		**JAH**
		EI
Jäävhamba liikuvus		**JAH**
		EI
Visuaalselt igeme taandumine ja/või furkatsiooni (juureharguse) paljandumine		**JAH**
		EI
Puuduv jäävhammas*		**JAH**
		EI
Ülemäärane jäävhammas*		**JAH**
		EI
Persisteerivad e. püsivad piimahambad – kas jäävhambast järglane on juba lõikunud või on visuaalse vaatluse põhjal piimahambana tuvastatav hammas suus ka mõlemapoolsete naaberjäävhammaste lõikumise järel		**JAH**
		EI
Hamba kõva koe defektid – krooni murd, emailidefekt, kulumine, resorptsioonikahjustus		**JAH**
		EI
Hamba värvuse muutus		**JAH**
		EI

** **Koeral** on jäävhammastikus ülalõualuus 2 x 3 lõikehammast e. intsisiivi, 2 x 1 kihv, 2 x 4 premolaari e. eespurihammast, 2 x 2 molaari e. tagapurihammast; alalõualuus 2 x 3 lõikehammast e. intsisiivi, 2 x 1 kihv, 2 x 4 premolaari e. eespurihammast, 2 x 3 molaari e. tagapurihammast = KOKKU 42. Ülalõualuu suurim purihammas on 4. premolaar, alalõualuu suurim 1. molaar*
***Kassil** on jäävhammastikus ülalõualuus 2 x 3 lõikehammast e. intsisiivi, 2 x 1 kihv, 2 x 3 premolaari e. eespurihammast, 2 x 1 molaari e. tagapurihammast; alalõualuus 2 x 3 lõikehammast e. intsisiivi, 2 x 1 kihv, 2 x 2 premolaari e. eespurihammast, 2 x 1 molaari e. tagapurihammast = KOKKU 30. Ülalõualuu suurim purihammas on 4. premolaar, alalõualuu suurim 1. molaar*

PATSIENDI ID: ...../...../.....

Kas hambumust oli võimalik hinnata/hinnati?		**JAH**
		EI

Kui JAH, siis: *(NB! vaata ka lisaabivahend lk. 4 – normaalne hambumus)*

Intsisiivide hambumus *(normaalne – ülalõualuu lõikehambarida paikneb alalõualuu lõikehammastest rostraalselt e. ninapoolselt, alalõualuu lõikehammaste krooni tipud hambuvad tihedalt vastu ülalõualuu lõikehammaste suulaepoolset aspekti)*		normaalne
		maloklusioon
		ei saa hinnata
Kihvade ja ülemise 3. lõikehamba hambumus *(normaalne – alumised kihvad on suunatud kaldu labiaalselt e. moka poole, suletud suu puhul väljub alumise kihva tipp ülemise 3. lõikehamba ja ülemise kihva vahemikust võrdsel kaugusel nii ülakihvast kui ülemisest 3. lõikehambast e. nende hammaste vahemiku keskelt)*		normaalne
		maloklusioon
		ei saa hinnata
Premolaaride e. eespurihammaste hambumus *(normaalne – alalõualuu premolaaride rida asetseb keelepoolsemalt ülalõualuu premolaaride reast ja suletud suu puhul moodustub küljelt vaadatuna nn. sik-sak, kus üla- ja alalõualuu premolaaride kroonitipud kokku ei puutu, vaid sihivad täpselt vastaslõualuu premolaaride vahemiku keskele; KOERAL on sik-saki 'alustajaks' alumine 1. premolaar, ülemise 1. premolaari krooni tipp on suunatud alumise 1. ja 2. premolaari vahemiku keskele jne. KASSIL, kel puuduvad ülemine 1. ja alumised 1. ja 2. premolaar, on sik-saki alustajaks ülemine 2. premolaar, alumise 3. premolaari tipp on suunatud ülemise 2. ja 3. premolaari vahemiku keskele jne.)*		normaalne
		maloklusioon
		ei saa hinnata
Ülemise 4. premolaari ja alumise 1. molaari hambumus *(normaalne – ülemine 4. premolaar hambub alumisest 1. molaarist põse poole, varjates suletud suu puhul küljelt vaadatuna kogu või enamiku alumisest 1. molaarist)*		normaalne
		maloklusioon
		ei saa hinnata
Hamba või hammaste asendi muud muutused – hamba pöördumine ümber oma telje e. rotatsioon, hamba krooni telje vale suund, hamba paiknemine hambareast väljas, hammaste nn. liigtihe paigutus		jah
		ei
		ei saa hinnata
Kas esineb traumat tekitav/patsiendile vaevusi valmistav maloklusioon e. valehambumus (hammas – hamba patoloogiline kontakt või hamba-pehme koe traumat tekitav kontakt või suu avamist/sulgemist takistav hamba asendimuutus)		jah
		ei
		ei saa hinnata
Kui esineb kõrvalekalle normaalsest hambumusest - kas peetakse esinevat maloklusiooni tõustandardi kohaseks/ tõule omaseks		jah
		ei
		ei saa/oska hinnata
		maloklusiooni ei esine

Normaalne hambumus - abivahend

1. Intsisiivide normaalne hambumus – üla- ja alalõualuu keskjooned on eestvates kohakuti, ülalõualuu lõikehambarida paikneb alalõualuu lõikehammastest rostraalselt e. ninapoolselt, alalõualuu lõikehammaste krooni tipud hambuvad tihedalt vastu ülalõualuu lõikehammaste suulaepoolset aspekti, KOERAL on paiknevad intsisiivid piki kergelt sümmeetriliselt kaarduvat telge, KASSIL on intsisiivid praktiliselt sirgel teljel.

2. Kihvade ja ülemise 3. lõikehamba normaalne hambumus – alumised kihvad on suunatud kaldu labiaalselt e. moka poole, suletud suu puhul väljub alumise kihva tipp ülemise 3. lõikehamba ja ülemise kihva vahemikust võrdsel kaugusel nii ülakihvast kui ülemisest 3. lõikehambast e. nende hammaste vahemiku keskelt. Alumisel kihval on vabalt ruumi väljuda, st ei esine limaskestale vigastusi jätvat survet ja/või hõõrdumist teiste hammaste vastu.

3. Premolaaride e. eespurihammaste normaalne hambumus – alalõualuu premolaaride rida asetseb keelepoolsemalt ülalõualuu premolaaride reast ja suletud suu puhul moodustub küljelt vaadatuna nn. sik-sak, kus üla- ja alalõualuu premolaaride kroonitipud kokku ei puutu, vaid sihivad enam-vähem täpselt vastaslõualuu premolaaride vahemiku keskele; KOERAL on sik-saki ’alustajaks’ alumine 1. premolaar, ülemise 1. premolaari krooni tipp on suunatud alumise 1. ja 2. premolaari vahemiku keskele jne. KASSIL, kel puuduvad ülemine 1. ja alumised 1. ja 2. premolaar, on sik-saki alustajaks ülemine 2. premolaar, alumise 3. premolaari tipp on suunatud ülemise 2. ja 3. premolaari vahemiku keskele jne.

4. Ülemise 4. premolaari ja alumise 1. molaari normaalne hambumus – ülemine 4. premolaar hambub alumisest 1. molaarist põse poole, varjates suletud suu puhul küljelt vaadatuna kogu või enamiku alumisest 1. molaarist.

5. Hamba või hammaste asendi muud muutused – hamba pöördumine ümber oma telje e. rotatsioon hammaskaarel, hamba krooni telje vale suund (hamba kroon suundub normaalsest nt. suulae poole või suuesiku poole või hammaskaares ettepoole või tahapoole), hamba paiknemine hambareast väljas (ruumipuuduse tõttu, sage lühipealistel), hammaste nn. liigtihe paigutus (kaks hammast on nii tihedalt kõrvuti, et nende vahel pole ruumi igemele – nt. piimahammas ja jäävhammas kõrvuti, lühipealistel sageli premolaarid jne.)

PATSIENDI ID: ...../...../..... Küsimused omanikule 1

Milliseks hindate oma lemmiku suuõõne ja hammaste olukorda/tervist?		hea
		keskmine
		halb
Kas olete märganud oma lemmiku juures järgmist (märkige kõik sobiv):		ebameeldiv suulõhn
		hambakivi ja/või katt hammastel
		igemete punetus
		ma ei ole oma lemmikule suhu vaadanud
Kas harjate oma lemmiku hambaid?		jah
		ei
Kui jah, siis kui tihti te tema hambaid harjate:		iga päev
		paar korda nädalas
		harvem
Kas annate oma lemmikule suuõõne ja hammaste tervist toetavaid tooteid (nt. spetsiaalsed toidud, närimismaiused, söödalisandid vms.)?		jah
		ei
Kui jah, siis kui tihti te neid annate:		iga päev
		paar korda nädalas
		harvem
Neid tooteid soetate te (märkige kõik sobivad):		loomaarsti juurest (loomakliinikust)
		apteegist
		lemmikloomapoest
		tavapoest
		veebipoest
		mujalt (täpsustage) ....
Kust saate informatsiooni ja nõustamist oma lemmiku suuõõne ja hammaste tervise ja hoolduse kohta (märkige kõik sobivad)?		loomaarsti juurest (loomakliinikust)
		apteegist
		lemmikloomapoest
		teistelt koera- või kassiomanikelt
		lemmiku kasvatajalt
		raamatutest
		ajakirjandusest
		veebiallikatest
		mujalt (täpsustage) ....
Kas nendest informatsiooniallikatest saadud teave teie lemmiku suuõõne ja hammaste tervise ja hoolduse kohta on teie hinnangul piisav?		jah
		ei
Kas nendest informatsiooniallikatest saadud teave teie lemmiku suuõõne ja hammaste tervise ja hoolduse kohta on teie hinnangul teile abiks olnud?		jah
		ei

PATSIENDI ID: ...../...../..... Küsimused omanikule 2

Kas sooviksite saada rohkem teavet ja nõustamist oma lemmiku suuõõne ja hammaste tervise ja hoolduse kohta?		jah
		ei
Kui vastasite eelmisele küsimusele jah, siis kuiidas/kust sooviksite saada teavet ja nõustamist oma lemmiku suuõõne ja hammaste tervise ja hoolduse kohta – märkige kõik sobivad vastusevariandid		loomaarsti juurest (loomakliinikust)
		apteegist
		lemmikloomapoest
		teistelt koera- või kassiomanikelt
		lemmiku kasvatajalt
		raamatutest
		ajakirjandusest
		veebiallikatest
		mujalt (täpsustage) ....

Täname Teid uuringus osalemast! Tagame, et looma ja omaniku andmete kaitse ning anonüümsus on andmete käsitlemise ja analüüsimise käigus tagatud ning uuringu tulemusi esitatakse vaid üldistatud kujul.

Appendix 2.

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Hereby I, Annina Maria Aula

22/01/93

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